Appendix T:
Air Quality Resource Management Plan: Adaptive Management Strategy for Oil and Gas Resources

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Table of Contents

List of Tables

Acronyms

APD	Application for Permits to Drill
AQRV	Air quality related value
AQTW	Air Quality Technical Workgroup
ARMP	Air Resource Management Plan
ARTSD	Air Resource Technical Support Document
BiFO	Billings Field Office
BLM	Bureau of Land Management
CAMx	Comprehensive Air Quality Model with Extensions
CBNG	Coal bed natural gas
CFR	Code of Federal Regulations
CMAQ	EPA Models-3/Community Multiscale Air Quality
CO	Carbon monoxide
DOI	U.S. Department of Interior
EPA	U.S. Environmental Protection Agency
FS	U.S. Forest Service
FLIR	Forward looking infrared
FWS	U.S. Fish and Wildlife Service
hp	Horsepower
IWG	Interagency Working Group
IR	Indian Reservation
MAAQS	Montana Ambient Air Quality Standards
$\mu g/m^3$	Micrograms per cubic meter
MDEQ	Montana Department of Environmental Quality
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPS	National Park Service
O_3	Ozone
Pb	Lead
PGM	Photochemical grid modeling
PM_{10}	Particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with a diameter less than or equal to 2.5 microns
POD	Plan of Development
ppb	Parts per billion
ppm	Parts per million
REC	Reduced emissions completion
ROD	Record of Decision
RMP	Resource Management Plan
SEIS	Supplemental Environmental Impact Statement
SLAMS	State or Local Air Monitoring Station
SO_2	Sulfur dioxide
VOC	Volatile organic compound
WRAP	Western Regional Air Partnership
WRF	Weather and Research Forecasting

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1.0 INTRODUCTION

1.1 Purpose of the Air Management Plan

The Bureau of Land Management (BLM) Billings Field Office (BiFO) Air Resource Management Plan (ARMP) for oil and gas activities describes the air quality adaptive management strategy that would be used to assess future air quality and Air Quality Related Values (AQRVs) and identify mitigation measures to address unacceptable impacts that may be associated with future oil and gas development. The adaptive management strategy focuses on oil and gas activity because aggregated emissions from multiple small sources at well sites can potentially cause significant air quality and AQRV impacts under certain circumstances. Many of these small oil and gas emission sources are not required to obtain air quality permits from the Montana Department of Environmental Quality (MDEQ), unlike large stationary sources such as coal mines that are permitted and inspected by the MDEQ. The oil and gas adaptive management strategy was prepared by the BLM in collaboration with the U.S. Environmental Protection Agency (EPA) and three federal land management agencies under the *Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior [DOI], and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act [NEPA] Process* (DOI 2011). This agreement is described in more detail in Section 1.4.

The ARMP includes both near-term actions and long-term actions. In the near-term, the ARMP sets forth initial actions to maintain good air quality until regional modeling can be performed to further assess potential impacts to air quality and AQRVs. In the long-term, the ARMP provides ongoing management strategies to assess and adapt to new air quality and AQRV ambient monitoring and modeling data during the life of this Resource Management Plan (RMP).

The ARMP includes a multifaceted approach involving the following activities.

- Oil and gas activity assessment
- Ambient air quality monitoring support
- Air quality and AQRV assessment
- Future air quality and AQRV modeling
- Mitigation

Pollutant emissions addressed by the ARMP include the criteria air pollutants listed below.

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate matter with a diameter less than or equal to 10 microns (PM_{10})
- Particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

Lead emissions are not included because high concentrations of these pollutants are unlikely to occur from oil and gas development within the planning area.

The ARMP also addresses modeling and mitigation for the following AQRV assessments.

- Deposition of sulfur and nitrogen
- Lake acid neutralizing capacity

- Visibility

The adaptive management strategy for oil and gas resources provides the flexibility to respond to changing conditions that could not have been predicted during RMP development, as well as allow for the use of new technology and methods that may minimize or reduce impacts.

1.2 Revision of the Air Resource Management Plan

This ARMP may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances. Changes to the goals or objectives set forth in the BiFO RMP/EIS would require maintenance or amendment of the RMP while changes to implementation, including modifying this ARMP, may be made without amending the RMP.

1.3 Current Air Quality

Based on available monitoring data in the BiFO, air quality is generally good, except for industrial areas influenced by emissions from some refineries. See Chapter 3 for a description of air quality within the BiFO. Federal air quality standards for criteria air pollutants are known as National Ambient Air Quality Standards (NAAQS), while state-based standards are known as the Montana Ambient Air Quality Standards (MAAQS).

1.4 Background of the AQTW and the MOU Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the NEPA Process

The Air Quality Technical Workgroup (AQTW) is required to include representatives from the following agencies: the BLM, EPA, U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). Each of these agencies is a party to the *Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process* (DOI 2011) (herein referred to as the MOU). This agreement is designed to ". . . facilitate the completion of NEPA environmental analyses for Federal land use planning and oil and gas development decisions [DOI 2011]." Additional entities may also participate in the AQTW, such as the MDEQ and tribal entities.

The Memorandum of Agreement (MOU) sets forth collaborative procedures that the AQTW agencies use to analyze potential air quality and AQRV impacts. The agencies also work together to identify potential mitigation measures that may be needed to reduce impacts to air quality and AQRVs. The lead agency (the BLM in this case), in collaboration with the other agencies, has the responsibility to identify reasonable mitigation and control measures and design features to address adverse impacts to air quality. Mitigation measures may also address impacts to AQRVs at Class I areas and at sensitive Class II areas that have been identified by the BLM, FS, FWS, and NPS.

The AQTW provided input to this ARMP and will continue to work collaboratively on future modeling efforts associated with this RMP. Provisions of the MOU continue to apply to future oil and gas activities in the planning area. In some cases, air quality and AQRV modeling performed under this ARMP may be sufficient to address modeling needs for future oil and gas projects that would otherwise require additional modeling under the MOU. However, the ARMP in no way replaces provisions of the MOU. Determinations of existing modeling adequacy for future oil and gas activities that trigger the MOU would be made collaboratively by the AQTW using the procedures included in the MOU.

The MDEQ has the primary authority to protect air quality within the state. Although the MDEQ is not a signatory to the national MOU, successful air quality management of BLM-authorized oil and gas activities depends on a close working relationship between the BLM and MDEQ. The two agencies have worked together to improve air quality monitoring in the state and will continue to cooperate by sharing data, planning modeling efforts, and working together to identify emission reduction measures needed to maintain good air quality.

1.5 Relationship to the Montana SEIS ROD ARMP

This ARMP integrates and supplements earlier ARMP provisions within the *Record of Decision (ROD) for the Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans* (BLM 2008b). Provisions of the Montana Statewide Supplemental Environmental Impact Statement (SEIS) ARMP are currently in effect and were developed to address substantial predicted growth in coal bed natural gas (CBNG) drilling and production in the Powder River Basin. Based on extensive air quality and AQRV far-field modeling, predicted impacts described in the Supplemental Air Quality Analysis (BLM 2007, BLM 2008a) were associated primarily with projected emission increases from the operation of additional compressor engines. Consequently, increases in total compression horsepower were determined to be an indicator of oil and gas activity growth that could potentially degrade air quality and AQRVs.

ARMP provisions included in the SEIS ROD are summarized below.

- Emission Mitigation
    - Fugitive dust controls are required to reduce PM_{10} and $PM_{2.5}$ emissions from unpaved roads.
    - The number of wells connected to each compressor must be maximized and natural-gas-fired or electrical compressors or generators are required.
    - Operators within 5 miles of the Northern Cheyenne Indian Reservation (IR) and the Crow IR may be required to restrict the timing or location of CBNG development if monitoring or modeling by the MDEQ finds their CBNG development is causing or threatening to cause noncompliance with applicable local, state, tribal, and federal air quality laws, regulations, and standards, as well as state implementation plans developed by the MDEQ.
- Activity and Emission Monitoring
    - Compression horsepower associated with CBNG is required to be reviewed.
    - Annual emission inventory reports for CBNG operations are required to be submitted by operators.
- Ambient Air Quality Monitoring
    - The BLM will develop monitoring plans to track regional cumulative impacts to air quality and establish programmatic mitigation at predetermined action levels.
    - Ambient concentration data from the Billings St. Luke's monitoring site (and potential future sites) will be used to meet ambient monitoring requirements included in Table MON-1 of the SEIS ROD.

- Air Quality Impact Review
    - Oil and gas operators are required to provide information necessary for the BLM to conduct an analysis of air quality impacts when submitting exploration Applications for Permits to Drill (APDs) or field development project plans for CBNG development. BLM uses the information to determine the individual and cumulative impact on tribal air quality; disclose the analysis results in the appropriate NEPA document; and consult with the Tribe when the analysis shows impacts from a specific drilling or development proposal.
    - An Interagency Working Group (IWG) was formed consisting of the BLM, EPA, NPS, and FS and other federal agencies, state agencies, and tribal authorities to address CBNG development in the Montana portion of the Powder River Basin and its impacts to air quality. In addition to other resource responsibilities, the IWG is responsible for developing and recommending the monitoring and mitigation measures needed for each agency to ensure its actions achieve compliance with applicable air quality standards across jurisdictional boundaries.
- Air Quality and Visibility Modeling
    - The MDEQ agreed to complete an annual cumulative air quality impact model to track air quality impacts of CBNG development, including relevant CBNG development in Wyoming.
    - The BLM and the MDEQ will perform additional visibility modeling to assess visibility impacts when horsepower (hp) requirements for new CBNG wells in the Montana portion of the Powder River Basin exceed 133,956 hp.

The above requirements are being integrated into this ARMP. Some provisions are being updated to reflect the current state of knowledge, while other provisions are being expanded to provide for a more comprehensive adaptive management strategy. Modeling provisions within the SEIS ARMP are being revised to reflect an improved modeling approach (described in Section **Error! Reference source not found.**) that would provide a more comprehensive assessment of visibility and criteria pollutants, including ozone. CBNG development in the Montana portion of the Powder River Basin did not materialize as predicted at the time of the SEIS. According to the MDEQ, CBNG compression within the Montana portion of the Powder River Basin has decreased by 1,676 hp since January 1, 2010 (MDEQ 2011). Due to the lack of CBNG development and with no new compression equipment emissions to model, the MDEQ determined that additional ambient air quality monitoring would be the best air quality indicator. With funding provided by the BLM, two new monitoring stations were installed in the Powder River Basin east of the planning area near Birney (Rosebud County) and Broadus (Powder River County) in 2009.

The remainder of this ARMP describes each of the provisions being carried forward from the SEIS ARMP.

2.0 OIL AND GAS ACTIVITY ASSESSMENT

Each year, the BLM would track the number and locations of new oil and gas wells drilled on federal mineral estate and the number of new and abandoned producing wells on federal mineral estate. These numbers would be compared to the planning area Reasonably Foreseeable Development (RFD) and to the level of oil and gas development identified in the preferred alternative.

In addition, the BLM would estimate oil and gas emissions from federal mineral estate every three years for oil and gas wells drilled and producing after the ROD is signed. Emission estimates would be based on well types, well numbers, and knowledge of typical equipment and operations. Emission estimation methods are expected to improve over time as better data become available. The emission estimates would also account for implemented mitigation measures and for new emission control regulations as they become effective. Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the preferred alternative. The BLM would collect additional data related to oil and gas equipment and operations to improve emission inventory quality. One area identified for improvement involves acquiring better data on oil and gas equipment used in the planning area. In order to improve fugitive dust emission estimates, the number, type, and length of vehicle trips in high-activity areas would also be assessed.

For the portion of the Powder River Basin located in the BIFO, increases in compressor horsepower would be tracked annually using data provided by the MDEQ.

Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the preferred alternative.

3.0 AMBIENT AIR QUALITY MONITORING SUPPORT

The MDEQ Air Resources Management Bureau has primary responsibility for siting and operating ambient air quality monitors within Montana and for reporting monitoring data to the EPA and to the public. As described in its annual Air Quality Monitoring Network Plan (MDEQ 2012), the MDEQ identifies monitoring objectives for assessing ambient concentrations of criteria air pollutants and assessing compliance with the NAAQS and MAAQS.

MDEQ-operated monitors in the planning area are limited to two monitors located in Billings. Of these, CO and $PM_{2.5}$ concentration data from the Billings St. Luke's monitor (20-111-0085) would be considered to be representative of air quality in the planning area. The Billings Coburn Road monitor (30-111-0066) measures SO_2 concentrations near two refineries within 3 kilometers of the monitoring site. Due to the close proximity of the refineries, SO_2 concentrations from the Coburn Road site are not representative of SO_2 concentrations in rural oil and gas activity areas and data from this monitor would not be reviewed under this plan.

Due to the area's low concentrations of CO, NO_2, ozone, and PM_{10}, these pollutants are not currently monitored in the planning area. If, in future years, additional MDEQ-operated monitoring stations are installed and operated for the purpose of assessing air quality impacts from oil and gas activity, ambient monitoring data from these monitors would be used for ambient air quality assessments under this plan.

4.0 AIR QUALITY AND AQRV ASSESSMENT

The BLM would assess air quality and AQRVs on an annual basis using quality-assured data from the EPA, MDEQ, FS, FWS, NPS, and other sources. In addition, if ozone monitoring data become available for the planning area, a preliminary assessment of ozone concentrations would be performed on a weekly basis using data provided by the MDEQ.

4.1 Annual NAAQS and MAAQS Assessment

Based on the representative monitor(s) listed in Section **Error! Reference source not found.**, the BLM would assess air quality monitoring data annually and would share the results of the assessment with the MDEQ and AQTW. The purposes of the annual assessment are to compare monitored data to NAAQS and MAAQS and to identify seasonal and long-term trends in air pollutant concentrations. The BLM would complete the annual assessment by May 31 of each year in order to ensure that quality-assured data are available for review. Monitoring data associated with exceptional events, typically due to wildfires, would be excluded from the assessment.

NAAQS and MAAQS are provided in Table 1. Montana standards are shown only if they are more stringent than the NAAQS.

Table 1. Ambient Air Quality Standards

Pollutant	Averaging Period	Federal NAAQS [1]			MAAQS [2]
		Concentration	Standard Type	Form of NAAQS Primary Standard	Concentration
CO	1-hour	35 ppm	Primary	Second maximum	23 ppm[6]
	8-hour	9 ppm	Primary	Second maximum	---
NO_2	1-hour	100 ppb	Primary	3-year average of the 98th percentile concentrations	0.30 ppm
	Annual	53 ppb	Primary, Secondary	Annual mean	0.05 ppm [8]
Ozone	1-hour	---	---	---	0.12 ppm [8]
	8-hour	0.075 ppm	Primary, Secondary	3-year average of the fourth highest daily maximum 8-hour average	---
$PM_{2.5}$	24-hour	35 µg/m^3	Primary, Secondary [4]	3-year average of the 98th percentile concentration	---
	Annual	15.0 µg/m^3 [3]	Primary, Secondary	3-year average of the annual mean	---
PM_{10}	24-hour	150 µg/m^3	Primary, Secondary	NTBE more than one per year on average over 3 years	---
	Annual	Revoked [5]	---	---	50 µg/m^3 [6]
SO_2	1-hour	75 ppb	Primary	3-year average of the 99th percentile concentrations	0.50 ppm
	3-hour	0.5 ppm	Secondary	---	---
	24-hour	---	Primary	---	0.10 ppm[6]
	Annual	---	Primary	---	0.02 ppm[7]

CO carbon monoxide
µg/m^3 micrograms per cubic meter
MAAQS Montana Ambient Air Quality

[1] NAAQS are codified in Title 40 of the Code of Federal Regulations (CFR), Part 50.
[2] Montana AAQS are codified in Title 17, Chapter 8, Subchapter

	Standards
NAAQS	National Ambient Air Quality Standards
NO_2	nitrogen dioxide
NTBE	Not to be exceeded
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns
PM_{10}	particulate matter less than or equal to 10 microns
ppb	parts per billion
ppm	parts per million
SO_2	sulfur dioxide

2 of the Ambient Air Quality in the Administrative Rules of Montana.

[3] EPA proposed to revise the annual primary $PM_{2.5}$ standard to within a range of 12–13 µg/m^3.

[4] EPA proposed a new secondary standard for $PM_{2.5}$ visibility of 28 or 30 deciviews (equivalent to 24 or 19 kilometers [15 or 12 miles] standard visual range).

[5] The annual PM_{10} NAAQS was revoked October 17, 2006.

[6] Based on annual second maximum.

[7] Not to be exceeded in the averaging period specified.

[8] State violation when exceeded more than once during any 12 consecutive months.

Although most of the pollutants are not currently monitored in the planning area, the standards are provided to illustrate the framework for assessing monitoring data that may become available in the future. The standards shown in Table 1 would be revised to reflect future regulatory changes.

The BLM would use design values to compare ambient monitoring data to the NAAQS. Design values reflect the form of the NAAQS; they define the statistical metric used to compare monitoring data to federal standards. Depending on the pollutant and averaging time being assessed, a NAAQS is typically stated in terms of the maximum or second maximum concentration, average concentration, or a percentile of the standard. The form of a standard also states whether the design value is determined based on one or more years of monitoring data. EPA-calculated design values serve a critically important regulatory purpose; they determine whether areas are designated attainment or nonattainment. As such, EPA's design value determinations may take more than one year to finalize.

In order to review air quality trends more quickly, the BLM would calculate "mitigation design values" by May 31 of each year for the previous calendar year(s). The mitigation design value would be a metric calculated by the BLM that uses procedures similar to EPA's regulatory design value calculation methodology, with the advantage that the BLM-calculated values can be determined more quickly. The timing allows the MDEQ adequate time to quality assure monitoring data. However, the MDEQ may not yet have EPA concurrence on data that has been flagged by the MDEQ due to exceptional events, such as wildfires. Consequently, the BLM-calculated mitigation design values would exclude monitoring data associated with MDEQ-identified exceptional events. Each BLM annual assessment would look back the requisite number of years for each pollutant and include data from the time period prior to ROD issuance for the first several annual BLM assessments. Additional information concerning design value calculations is provided in Section 6.2.3.

4.2 Preliminary Ozone Assessment

If an MDEQ-operated ozone monitor is installed and operated in the planning area, the BLM would perform weekly preliminary ozone concentration reviews to determine if high ozone events occur. If a high-ozone event occurs, the BLM would document meteorological and other conditions that may have contributed to the event. Because high-ozone events in other rural parts of the nation are not well understood and contributing factors can be site-specific, the BLM would gather data to develop baseline information relevant to any high-ozone events that may occur within the planning area. Relevant baseline information includes capturing meteorological data for each event, determining the amount of snow on the ground (if applicable), and identifying any other data that may help describe circumstances associated with the event. For the purposes of this effort, high-ozone events would be defined to be days for which the maximum 8-hour average ozone concentration is at or above 0.065 ppm.

In order to quickly ascertain relevant circumstances, the preliminary ozone assessments would use non-quality-assured data provided by the MDEQ. As part of the annual NAAQS assessment, quality-assured ozone data would be reviewed to determine if the preliminary ozone monitoring data were valid or if monitored high ozone concentrations were due to monitor malfunctions.

If high-ozone events occur within the planning area, a summary of events and a discussion of relevant meteorological data and circumstances would be developed as part of the annual NAAQS assessment. These summaries and the underlying data may provide important information that can be used to predict potential occurrences of high-ozone events and to identify mitigation measures and/or proactive measures that could prevent future events.

4.3 Annual AQRV Assessment

Federal land managers track the status, condition, and trends of AQRVs for Class I and sensitive Class II areas under their jurisdictions. Consequently, the BLM would request visibility, sulfur and nitrogen deposition, and lake acid neutralizing capacity data from the FS, FWS, and NPS and would include agency-submitted data in the BLM's annual review of AQRV trends. The annual review would also include AQRV data from any Class I or sensitive Class II areas under BLM jurisdiction.

Based on these reviews, the BLM would maintain an awareness of AQRV trends. However, it should be noted that the reviews would not necessarily link AQRV trends to oil and gas development. AQRV impacts are often associated with pollutants that can be transported long distances from many different types of sources. For example, visibility degradation in eastern Montana primarily results from large stationary sources such as electric generating units and cement kilns, as addressed in the Montana Regional Haze Federal Implementation Plan (EPA 2012b).

Photochemical grid modeling (PGM) would be completed after the ROD is signed and would provide additional information concerning the potential impact BLM-authorized of oil and gas emissions and cumulative emissions on AQRVs.

5.0 FUTURE MODELING

The BLM has committed to perform PGM in order to assess regional air quality and AQRV impacts. Due to insufficient monitoring and regional emissions data available during development of the RMP, PGM would not be completed prior to issuance of the RMP/EIS and the ROD. In order to complete PGM expeditiously, the BLM has begun data acquisition and initiated steps needed to proceed with PGM. When PGM is completed and the results assessed, the BLM may identify additional emission mitigation measures for oil and gas activity.

5.1 Photochemical Grid Modeling

Comprehensive regional air quality and AQRV regional modeling of emission sources within the BiFO and surrounding areas requires PGM. This type of modeling can predict ozone and regional haze impacts, for which major pollutants and precursors can be transported many hundreds of miles.

5.1.1 Data Acquisition

PGM requires three main types of concurrent data: meteorological data, ambient monitoring data, and comprehensive emission data. BLM's analysis determined that the latter two types of data need to be augmented and updated prior to performing PGM.

5.1.1.1 Additional Monitoring

Ambient monitoring data throughout the regional PGM domain (which would extend throughout most of Montana and into adjacent states) are needed in order to validate model performance, which is assessed by modeling a previous year and comparing the model's predicted concentrations to actual monitored concentrations.

In cooperation with the MDEQ, the BLM funded two new monitoring stations in north-central Montana and would provide staffing and additional funding to operate the monitors. One monitor is located near Malta in Phillips County and the other is located in Lewistown (Fergus County). Both monitors became operational in July 2012 and measure ambient concentrations of nitric oxide (NO), NO_2, nitrogen oxides (NO_x, an ozone precursor), ozone, PM_{10}, and $PM_{2.5}$. These data would be particularly helpful in assessing the photochemical grid model's ability to accurately predict concentrations of these pollutants and its ability to accurately predict regional haze and visibility impacts.

5.1.1.2 Updating Emission Inventories

Comprehensive emission inventories are also critically important in predicting cumulative air quality and AQRV impacts. Current oil and gas regional emission inventories for Montana and the Dakotas are known to lack important emission sources, particularly sources of volatile organic compounds (VOCs), which contribute to ozone formation. The existing oil and gas inventories for the Williston and Central Montana Basins represent the year 2002 and were developed as part of the Western Regional Air Partnership (WRAP) Phase II inventory. Since then, 2006 Phase III emission inventories have been developed for oil and gas basins within Colorado, Utah, Wyoming, and New Mexico, but have not yet been completed for Montana, North Dakota, and South Dakota. The Phase III inventories have more comprehensive emission inventories of VOC sources at oil and gas facilities.

The BLM Montana and Dakotas State Office is providing financial assistance to the WRAP so that Phase III oil and gas emission inventories can be completed in 2013 for the Williston Basin and the Central

Montana Basin. These inventories would represent calendar year 2011 emissions. In addition to covering the planning area, the inventories would include comprehensive recent emission estimates for oil and gas activity in North Dakota and South Dakota.

5.1.2 PGM Schedule

In order to use a full 12 months of ambient monitoring data from the new Malta and Lewistown monitors, the baseline year for PGM is expected to be 2013 or may be a 12-month period beginning in late 2012 and ending in 2013. PGM planning began in 2012 and development of the PGM modeling protocol is expected to be completed during 2013, with modeling occurring primarily in 2014 and early 2015. Review and assessment of PGM results would be completed in June 2015. **Error! Reference source not found.** provides the planned data acquisition and PGM schedule.

Table 2. Data Acquisition and PGM Schedule

Task / Subtask	Duration (calendar days)	Start Date	End Date
Pre-Modeling Emission Inventory Development			
Emission Inventory Contracting	56	7/16/2012	8/27/2012
"WRAP" Williston and Central Montana Basin Inventory	270	11/1/2012	7/29/2013
Contracting for WRF Model and PGM Protocol			
WRF Model and PGM Protocol RFP	56	7/16/2012	9/10/2012
Select PGM Modeling Protocol Contractor	14	9/11/2012	9/25/2012
PGM Protocol			
Develop Initial Draft WRF and PGM Protocol	102	10/1/2012	1/10/2013
AQTW and IWG Protocol Review	26	1/11/2013	2/6/2013
Finalize Protocol	54	2/7/2013	4/2/2013
Contracting for WRF and PGM Modeling			
WRF and PGM RFP	30	4/2/2013	5/2/2013
Select WRF and PGM Contractor	21	5/3/2013	5/24/2013
Base Year (calendar year 2013) Modeling and Evaluation			
WRF Modeling	120	10/23/2013	2/20/2014
Draft WRF Model Evaluation	30	2/20/2014	3/22/2014
AQTW and IWG WRF Evaluation Review	30	3/22/2014	4/21/2014
Emission Modeling (Base and Future Year) & Report	120	10/23/2013	2/20/2014
Photochemical Grid Modeling	150	2/20/2014	7/20/2014
Draft PGM Evaluation	30	7/20/2014	8/19/2014
AQTW and IWG PGM Evaluation Review	30	8/19/2014	9/18/2014
Finalize WRF and PGM Evaluations	21	9/18/2014	10/9/2014
Future Year Modeling and Evaluation			
Photochemical Grid Modeling	150	10/9/2014	3/8/2015
Analyze Air Quality and AQRV Impacts	21	3/8/2015	3/29/2015
Draft ARTSD	21	3/29/2015	4/19/2015
AQTW and IWG ARTSD Review	30	4/19/2015	5/19/2015

Table 2. Data Acquisition and PGM Schedule

Task / Subtask	Duration (calendar days)	Start Date	End Date
Finalize ARTSD	21	5/19/2015	6/9/2015

AQTW = Air Quality Technical Workgroup
ARTSD = Air Resource Technical Support Document
IWG = Interagency Working Group
MDEQ = Montana Department of Environmental Quality
PGM = Photochemical grid modeling
RFP = Request for Proposal
WRF = Weather Research and Forecasting Model
WRAP = Western Regional Air Partnership

The Weather Research and Forecasting (WRF) model would be used to model meteorological conditions and the photochemical grid model to be used would be either the EPA Models-3/Community Multiscale Air Quality (CMAQ) modeling system or the Comprehensive Air Quality Model with Extensions (CAMx). In addition, multiple models would be used to develop and process emission inventories for input into the photochemical grid model. When modeling is completed, an Air Resource Technical Support Document (ARTSD) would be developed.

Initial PGM would include future year modeling for a year between 2017 and 2020. The specific year would be determined by the BLM based on the ability to predict future regional oil and gas emissions in the Williston and Central Montana Basins. After initial PGM is completed, the BLM would begin an assessment process to determine when additional PGM updates are needed. Factors to be considered in determining when additional PGM is needed include: 1) the adequacy of the adaptive management strategy to maintain good air quality, and 2) the level of BLM-authorized oil and gas activity and emissions compared to modeled levels

5.1.3 MDEQ and AQTW and IWG Review and Input to PGM

Throughout the PGM data collection and modeling process, the BLM would work collaboratively with the MDEQ and the AQTW that was formed to work on this RMP, with the IWG, and with other agencies or Tribes that request to be involved in the PGM effort. These collaborators would provide technical review and comment on the draft modeling protocol, on WRF and PGM performance evaluations, and on the draft ARTSD. Substantial time has been included in the schedule shown in **Error! Reference source not found.** to allow adequate review and comment periods during the PGM process.

5.1.4 Availability of PGM Results

Future PGM results would be presented in the final ARTSD and in a summary of the results. The ARTSD and summary document would be posted on the BiFO BLM website. In addition, the modeling protocol document would be provided via the website when the photochemical modeling ARTSD is made available. Outreach information regarding the availability of the results would be made through the AQTW, IWG, and other agencies involved in the PGM process, as well as other interested parties.

5.2 Post- PGM Modeling

To the extent that future emission increases are within the levels modeled with PGM or other modeling and are proximate to modeled emission locations, far-field air quality and AQRV impact analysis may

incorporate by reference PGM and other modeling results. The BLM and the AQTW would determine whether previous modeling is sufficient to satisfy MOU requirements. This air quality management approach is consistent with the MOU (DOI 2011) and allows for efficient air quality and AQRV impact analysis.

If additional modeling is performed after PGM is complete, an assessment of air quality and AQRV impacts would be made and, if necessary, additional mitigation measures may be identified.

6.0 MITIGATION

Air quality and AQRV impact mitigation would involve two types of mitigation: 1) initial mitigation measures that become effective when the ROD is signed, and 2) enhanced mitigation measures that may be identified based on future ambient monitoring data or modeling results.

6.1 Initial Mitigation Actions

The following air quality mitigation measures would be applied upon issuance of the ROD through leasing documents and project-specific NEPA documents. To the extent practical, emission reductions associated with these mitigation measures have been included in the emission inventory.

1. Design and construct roads and well pads to reduce the amount of fugitive dust generated by traffic or other activities. During construction activities, apply water, apply dust-suppression chemicals, apply gravel, or use other control methods to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

2. Use water or other BLM-approved dust suppression during drilling, completion, and well workover operations for dust abatement on access roads, as needed, to achieve a 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

3. Use water or other BLM-approved dust suppression in high traffic areas during production operations for dust abatement, as needed, to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen. Operators would work with local government agencies to improve dust suppression on roads.

4. For oil and gas Project Plans of Development (PODs), oil and gas operators would establish speed limits for project-required unpaved roads in and adjacent to the project area; oil and gas operator employees would comply with these speed limits.

5. For oil and gas Project PODs, oil and gas operators would be encouraged to reduce surface disturbance, vehicle traffic, and fugitive dust emissions by consolidating facilities (e.g., using multi-well pads, storage vessels) when feasible.

6. Diesel drill rig engines greater than 200 hp would meet Tier 4 emission standards for non-road diesel engines. Alternatively, oil and gas operators may use drill rig engines that exceed Tier 4 emission standards if modeling demonstrates compliance with the NAAQS and protection of AQRVs.

7. For hydraulically fractured gas wells that do not qualify as “low pressure wells”, “wildcat,” or “delineation” wells, oil and gas operators would comply with reduced emissions completion (REC) requirements specified in Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution (40 CFR §60.5375) within six months of ROD issuance.

8. Non-road diesel engines would be required to use ultra-low sulfur diesel fuel (15 ppmw) as required by 40 CFR §80.610(e)(3)(iii).

9. Natural-gas-fired or electrical compressors or generators would be required at compressor stations in the Powder River Basin.

10. CBNG operators proposing a POD within 5 miles of the Northern Cheyenne IR or the Crow IR would be required to provide the information necessary for BLM to conduct an analysis of air quality impacts. The BLM would use the information to determine the impact on air quality in the Northern Cheyenne IR and the Crow IR, disclose the analysis results and subsequent mitigation in the appropriate NEPA document, and consult with the Tribes when the analysis shows that air quality or AQRV impacts are anticipated from a specific development proposal.

11. CBNG operators within 5 miles of the Northern Cheyenne IR and the Crow IR may be required to restrict the timing or location of CBNG development if monitoring or modeling by the MDEQ finds their CBNG development is causing or threatening to cause noncompliance with applicable local, state, tribal, and federal air quality laws, regulations, and standards, as well as state implementation plans developed by the MDEQ.

6.2 Monitoring-Based Mitigation

Enhanced mitigation would be evaluated and implemented if ambient monitoring data at monitor(s) located in oil and gas activity areas within the planning area indicate that pollutant concentrations are approaching or threatening the NAQQS or MAAQS. Prior to completion of initial PGM, monitoring-based thresholds would be based on evaluation of exceedances of the NAAQS, as described in Section **Error! Reference source not found.**. After completion of initial PGM, monitoring-based thresholds would be based on BLM-calculated design values, as described in Section **Error! Reference source not found.**.

6.2.1 Monitoring-Based Thresholds Before PGM Completion

Based on requests from EPA during the MOU review process, the BLM would review NAAQS exceedances and determine if enhanced mitigation would be warranted during the interim period between ROD issuance and PGM completion. The BLM would require enhanced mitigation for BLM-authorized oil and gas activities if there is a monitored exceedance of the NAAQS at the St. Luke's monitor, unless the BLM determines that enhanced mitigation is not warranted after completing specified steps as outlined below and in Section **Error! Reference source not found.**.

1. The BLM would notify the EPA and the MDEQ within 30 days after St. Luke's monitoring data showing an exceedance has been posted on EPA's Air Quality System (AQS). The notification would state that the BLM is reviewing the exceedance according to this procedure.

2. After consulting with the MDEQ, the BLM would determine whether an exceptional event[1] may have caused the exceedance.

- If the MDEQ informs the BLM that an exceptional event likely caused the exceedance, the BLM would provide a letter to that effect to the EPA. No further action would be necessary.

- If an exceptional event did not cause the exceedance or if MDEQ would not submit an exceptional event waiver to EPA, the BLM would perform Step 3.

[1] The BLM would not formally decide that an exceptional event occurred as this decision would be made by MDEQ. Until a final determination of an exceptional event is presented to EPA by MDEQ, and the EPA has concurred, the BLM would assume that an exceptional event occurred based on a stated intention by the MDEQ to submit an exceptional event waiver.

3. The BLM would conduct a screening level analysis[2] to determine the likely source and location of the exceedance and whether mitigation is needed.[3]

- If the screening analysis indicates that the exceedance was not caused by BLM-authorized oil and gas source(s) within the planning area or indicates that the BLM-authorized oil and gas source(s) within the planning did not contribute to the exceedance, the BLM would convey this finding in writing to the MDEQ and EPA for review and comment. No further action would be necessary.

- If the screening analysis indicates that the exceedance was caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would perform Step 4.

4. The BLM would consult with the MDEQ and EPA to determine whether there is a need for: 1) a refined attribution analysis (e.g., attribution test using CAMx ozone source attribution technology or anthropogenic precursor's culpability assessment) or 2) mitigation on BLM-authorized oil and gas emission sources within the planning area. If the refined analysis:

- Is warranted, BLM would perform the refined analysis within 6 months of completing Step 3 in consultation with MDEQ and EPA.
- Indicates that the exceedance was not caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would provide that recommendation to the MDEQ and EPA for review and comment. No further action would be necessary.
- Indicates that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, the BLM would evaluate enhanced mitigation measures, as described in Section **Error! Reference source not found.**

6.2.2 Determination of Enhanced Mitigation Measures Before PGM Completion

If a NAAQS exceedance occurs prior to completion of PGM and the refined analysis in Step 4 above determined that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, enhanced mitigation measures would be evaluated and selected by the BLM, in cooperation with the MDEQ, IWG, and AQTW, when appropriate. Preference would be given to mitigation methods that the MDEQ intends to impose as new regulations or air quality permitting provisions. Selected mitigation measures would be implemented within one year after the BLM decision to apply additional mitigation.

Potential enhanced mitigation measures include the measures listed below based on current information concerning potential emission reduction technologies. Additional measures or equivalent methods or emission restrictions may be identified in the future.

- Drilling and/or blowdown activity restrictions based on meteorological conditions
- Construction activity restrictions based on meteorological conditions

[2] Publically available web based applications suggested by EPA to identify sources of air pollution and potential impacts include the following sites: trajectory analysis tools like HySplit (http://ready.arl.noaa.gov/), air quality data at the EPA's AQS site (http://airnow.gov), state regulatory agency sites and airnowtech.org, an interactive snow site (http://www.nohrsc.nws.gov/interactive/html/map.html), daily ozone modeling (http://airquality.weather.gov/), daily ozone and $PM_{2.5}$ modeling site (http://www.getbluesky.org/), and daily satellite imagery site (http://ge.ssec.wisc.edu/modis-today/).

[3] If data necessary to conduct a screening level analysis is not available, the BLM would consult with the MDEQ and the EPA regarding source attribution and the need for mitigation.

- Centralization of gathering facilities
- Electric drill rigs
- Field electrification for compressors and/or pumpjack engines
- Plunger lift systems with smart automation
- Oil tank load out vapor recovery
- VOC controls on tanks with a potential to emit less than 5 tons per year
- Selective catalytic reduction on non-drill rig stationary engines
- Reduced emission completions beyond those required by EPA regulations, if determined to be technically and economically feasible
- Well pad density limitations
- Reducing the total number of drill rigs operating simultaneously
- Seasonally reducing or ceasing drilling during specified periods
- Using only lower-emitting drill and completion rig engines during specified time periods
- Using natural gas-fired drill and completion rig engines
- Replacing internal combustion engines with gas turbines for natural gas compression
- Employing a monthly forward looking infrared (FLIR) leak detection program to reduce VOCs
- Tank load out vapor recovery
- Enhanced VOC emission controls with 95% control efficiency on additional production equipment having a potential to emit of greater than 5 tons/year
- Enhanced direct inspection and maintenance program

6.2.3 Monitoring-Based Thresholds After PGM Completion

By May 31 of each year following completion of PGM, the BLM would calculate design values for each pollutant monitored at a federal reference monitor within the planning area and identified as a representative monitor in Section **Error! Reference source not found.**. The design value would be calculated based on calendar year monitoring data available at the time. For pollutants requiring three years of monitoring data for design value calculation, data from the appropriate prior period would be used. For example, based on PGM completion in mid-2015, the first annual design value calculation would be performed by May 31, 2016 and would include monitoring data for calendar years 2013, 2014, and 2015 for three-year design values and on monitoring data for calendar year 2015 for single-year design values. BLM design value calculations would exclude data associated with MDEQ-identified exceptional events and would be performed in accordance with EPA regulations and guidance.

Calculation methods would, to the extent possible, follow EPA procedures provided in the following appendices within Title 40 of the Code of Federal Regulations (CFR), Part 50 in effect as of December 1, 2012. These procedures may be updated by future EPA regulations and this section of the ARMP would be revised to reflect changing regulations.

- NO_2 (Appendix S)
- 0_3 (appendix P)
- PM_{10} (Appendix K)
- $PM_{2.5}$ (Appendix N)
- SO_2 (Appendix T)

BLM design value calculations would exclude data associated with exceptional events identified by MDEQ.

6.2.4 Determination of Enhanced Mitigation Measures After PGM Completion

If the air quality assessment described in Section **Error! Reference source not found.** indicates that a BLM-calculated design value is greater than 85 percent of a NAAQS, enhanced mitigation measures addressing that pollutant or pollutant precursor would be evaluated and selected by the BLM, in cooperation with the MDEQ, IWG, and EPA, when appropriate. Potential enhanced mitigation measures include the measures listed above in Section**Error! Reference source not found.**, as well as additional measures that may be identified in the future.

6.3 Modeling-Based Mitigation

6.3.1 Modeling-Based Thresholds

Future modeling would assess air quality and AQRV impacts from future BLM-authorized oil and gas activity and would include regional PGM and project-specific modeling. Modeling-based thresholds for evaluating enhanced mitigation would include potential future impacts on NAAQS or MAAQS or impacts above specific levels of concern for AQRVs in Class I or sensitive Class II areas (as identified on a case-by-case basis by MDEQ or a federal land management or tribal agency).

6.3.2 Modeling-Based Enhanced Mitigation Measures

If BLM-authorized oil and gas activity is predicted to cause or contribute to impacts above the thresholds described above, the BLM would facilitate an interagency process to ensure that a comprehensive strategy is developed to manage air quality impacts from future oil and gas development within the region. The local, state, federal, and Tribal agencies involved in the regulation of air quality and the authorization of oil and gas development would evaluate modeling results from future modeling studies and identify potential air quality concerns and necessary reductions in air emissions. If the modeling predicts significant impacts, these agencies would use their respective authorities to implement enhanced emission control strategies, operating limitations, equipment standards, and/or pacing of development as necessary to ensure continued compliance with applicable ambient air quality standards, including the enhanced mitigation measures listed in Section 6.2.2, other future mitigation measures identified through BLM's adaptive management strategy, or reasonable mitigation measures suggested by the MDEQ, IWG, or AQTW. If necessary, implementation of mitigation measures would occur within one year of obtaining final modeling results for mitigation measures that conform to currently implemented land use planning decisions and constraints.

7.0 BIBLIOGRAPHY

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